

Graphing Quadratics Investigation

Investigation – Graphing Quadratic Functions

IB Math SL

1. For each function:

- Find the value of the discriminant, $b^2 - 4ac$
- Graph the function on your GDC and then sketch the graph

a. $y = x^2 - 3x - 5$

e. $y = x^2 - 6x + 9$

b. $y = 3x^2 - 6x + 4$

f. $y = 2x^2 - 4x + 2$

c. $y = x^2 + 2x + 7$

g. $y = -x^2 + 5x + 2$

d. $y = 4x^2 + 3x + 5$

h. $y = x^2 + 7x + 3$

2. What is the relationship between the graph of the function and the value of the discriminant?

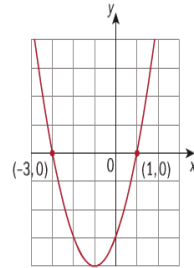
Graphing Quadratic Functions

Using axes intercepts

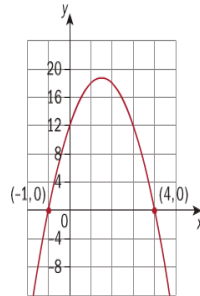
From standard form $y = ax^2 + bx + c$, **FACTOR!**

Intercept form: $y = a(x - p)(x - q)$

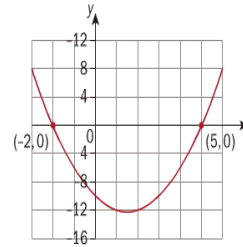
$$y = (x + 3)(x - 1)$$



$$y = -3(x + 1)(x - 4)$$



$$y = (x + 2)(x - 5)$$



What do you notice about the equations and the graphs?

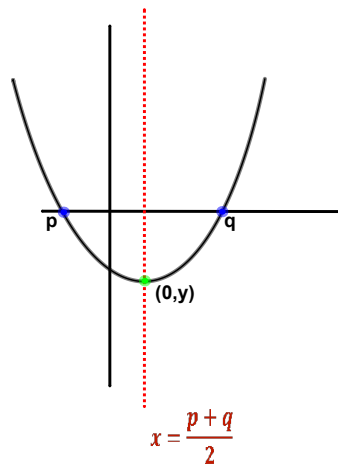
Graphing Quadratic Functions

Using axes intercepts

For quadratics in the form $y = a(x - p)(x - q)$:

- The x-intercepts are $(p, 0)$ and $(q, 0)$
- The equation for the axis of symmetry is $x = \frac{p+q}{2}$

*Don't forget
the y-intercept
occurs when $x = 0$



The x-intercepts
are also called
the roots,
the solutions,
or the answers!

Write the function $f(x) = x^2 + 3x - 10$ in the form $f(x) = (x - p)(x - q)$. Then sketch the graph of the function, labeling the x - and y -intercepts.

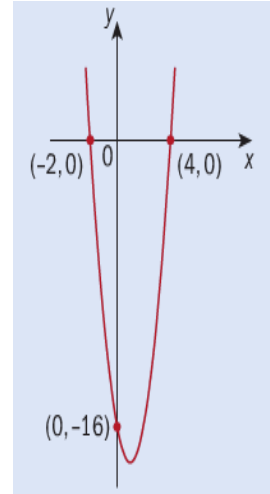
Write the function $y = 2x^2 - x - 3$ in the form $y = a(x - p)(x - q)$. Then sketch the graph of the function, labeling the x - and y -intercepts.

Write an equation for the graph below in the best form.

Then change to standard form, $y = ax^2 + bx + c$.

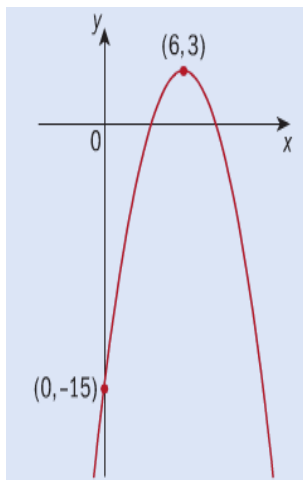
Steps:

1. What form 1st?
2. $y = a(x-p)(x-q)$
3. Plug in values and solve for a.
4. Rewrite your equation in $y=ax^2+bx+c$



Write an equation for the graph below in the best form.

Then change to standard form.



Steps:

1. What form 1st?
2. $y = a(x - h)^2 + k$
3. Plug in values and solve for a.
4. Rewrite your equation in, $y = ax^2+bx+c$

Using axes intercepts only, sketch the graphs of:

a $y = 2(x + 3)(x - 1)$ **b** $y = -2(x - 1)(x - 2)$ **c** $y = \frac{1}{2}(x + 2)^2$

Use the vertex, axis of symmetry and y -intercept to graph $y = -2(x + 1)^2 + 4$.

Determine the coordinates of the vertex of $y = 2x^2 - 8x + 1$.

Write $y = x^2 + 4x + 3$ in the form $y = (x - h)^2 + k$ by 'completing the square'.
Hence sketch $y = x^2 + 4x + 3$, stating the coordinates of the vertex.

Convert $y = 3x^2 - 4x + 1$ into the form $y = a(x - h)^2 + k$ by 'completing the square'. Hence, write down the coordinates of its vertex and sketch the graph of the function.

Using your GDC!

You can use your calculator to find the important parts of any parabola!

x-intercepts

- 2nd, Trace
- zero
- scroll to the left of the point, Enter
- scroll to the right of the point, Enter, Enter
- Repeat

Answers:
 ($\#$, 0) ; ($\#$, 0)



Using your GDC!

You can use your calculator to find the important parts of any parabola!

y-intercept

- Trace
- 0, Enter

Answer:
(0, #)



Using your GDC!

You can use your calculator to find the important parts of any parabola!

Vertex

- 2nd, Trace
- minimum or maximum
- scroll to the left of the point, Enter
- scroll to the right of the point, Enter
- Enter

Answer:
(#, #)



Axis of Symmetry

x = x-coordinate of the vertex

Answer:
x = #

Using your GDC, find the following for each quadratic:

i. x-intercept(s)

iii. vertex

ii. y-intercept

iv. equation for a.o.s.

a. $y = x^2 - 3x - 5$

b. $y = 3x^2 - 6x + 4$

e. $y = x^2 - 6x + 9$

g. $y = -x^2 + 5x + 2$

Homework

Chapter 2.4

2I: 1-5

2H: 1-3 (if you didn't do it yet)

Need more practice?

Haese and Harris

Ch 6 C